

NEBULAR HYPOTHESIS OF LAPLACE

French mathematician Laplace propounded his '**Nebular Hypothesis**' in the year 1796. Laplace assumed certain axioms for the postulation of his nebular hypothesis to solve the riddle of the origin of the earth.

(1) He assumed that there was a huge and hot gaseous nebula in the space.

(2) From the very beginning huge and hot nebula was rotating (spinning) on its axis.

(3) The nebula was continuously cooling due to loss of heat from its outer surface through the process of radiation and thus it was continuously reducing in size due to contraction on cooling.

Laplace maintained that there was a hot and rotating huge gaseous nebula in the space. There was gradual loss of heat from the outer surface of the nebula through radiation due to circular motion or rotation of the nebula. Thus, gradual loss of heat resulted into the cooling of the outer surface of the nebula. Gradual cooling caused gradual contraction in the size of the nebula. These processes e.g. gradual cooling and contraction, resulted into

continuous decreased in the size and volume of the nebula. Thus, reduction in the size and volume of the nebula increased the circular velocity (rotatory motion) of the nebula. AS the size of the nebula continued to decrease, the velocity of rotatory motion continued to increase.

Thus, the nebula started spinning at very faster speed and consequently the centrifugal force became so great that it exceeded the centripetal force. When this stage was reached the materials at the equator of the nebula became weightless.

Consequently, the outer layer was condensed due to excessive cooling and rotate with the still cooling and contracting central nucleus of the nebula and thus the outer ring (layer) was separated from the remaining part of the nebula. This separated ring of material started moving around the nebula and so it could not

Laplace further maintained that the original ring was divided into nine rings and each ring moved away from the other ring. All the materials of each ring condensed at a point or knot in the form of '**hot gaseous agglomeration**'. Each such agglomeration was later on cooled and condensed to form planet. Thus, nine planets were formed from nine rings and the remaining central nucleus of the nebula became the sun.

(1) Where did heat and motion in that nebula come from?

(2) What was the reason behind the formation of certain fixed number of planets from the irregular ring? Why did only 9 rings come out from the irregular ring detached from the nebula? Why not more or less than 9 rings?

CRITICISMS

(3) The small degree of cohesion between the particles of the nebula would make the formation continuous, not an intermittent process.

(4) If we accept the tenet of Laplace that the planets were formed from the nebula, then the planets must have been in liquid state in their initial stage. But the planets in liquid state can not rotate and revolve around the sun properly on of rings

- Sir James Jeans, a British scientist, propounded his 'tidal hypothesis' to explain the origin of the earth in the year 1919. Jeans postulated certain axioms (self proved facts) as given below.

(1) The solar system was formed from the sun and another intruding star.

(2) In the beginning the sun was a big incandescent gaseous mass of matter.

TIDAL HYPOTHESIS OF JAMES JEANS

- (3) Besides the sun, there was another star termed as 'intruding star' in the universe. This intruding star was much bigger in size than the primitive sun.
- (4) The primitive sun was stationary and was rotating on its axis.
- (5) The '**intruding star**' was moving along such a path in such a way that it was destined to come nearer to the primitive sun.
- (6) There was a great impact of the tidal force of the intruding star on the surface of the primitive sun.

Harold Jeffreys, a British scientist, modified the original tidal hypothesis of James Jeans in 1929 and presented his concept as **'Collision Hypothesis'**. According to Jeffreys there were three stars in the universe before the origin of our solar system. One was our primitive sun, the second one was its **'companion star'** and the third one was **'intruding star'** which was moving towards 'companion star.

MODIFICATION BY JEFFREYS

Thus, the intruding star collided against the 'companion star'. Due to head on collision the companion star was completely smashed and shattered, some shattered portions were scattered in the sky while remaining debris started revolving around the primitive sun. However, the impact of collision and explosion enabled the intruding star to clear itself off from the gravitational attraction of the primitive sun and gradually vanished in the universe. The planets of our solar system were formed from the remaining debris of the companion.

- (1) According to B. Levin the universe is infinite in space and time and the stars are so distant from each other that such a close encounter between them is a remote possibility.
- (2) James Jeans did not explain the whereabouts and destiny of the intruding star.
- (3) That tidal hypothesis fails to explain the real distances between the sun and the planets in our present solar system.

CRITICISM

Otto Schimidt, a Russian scientist, proposed his 'Inter-Stellar Dust Hypothesis' in 1943 to explain the complex problems of the origin and characteristics of the solar system and the earth.

INTER-STELLAR DUST HYPOTHESIS

According to the 'Inter Stellar dust hypothesis' our sun during its '**galactic revolution**' captured the dark matter of the universe. The dark matter of gaseous cloud and dust particles had their own angular momentum. The dark matter after being attracted by the sun during its 'galactic revolution' started revolving around the primitive rotating sun. These dark matter were called 'Inter-Stellar dusts' by Schimidt.

The dust particles after being combined and condensed were changed into a flat disc which started revolving, around the sun. It may be pointed out that flat disc of captured dark matter started revolving around the sun under the combined impacts of three types of motions e.g. (i) the rotational motion of the sun itself. (ii) gravitational force exerted by the sun on the disc of dark matter and (iii) the angular momentum of dark matter of the disc.

The particles having larger amount of centrifugal force were thrown out towards the margins of the rotating disc of dark matter around the sun while the particles having small amount of centrifugal force attracted towards the band of the disc nearer to the sun.

The intense heat of the sun dispersed the gaseous particles towards the margins of the disc. Collision among the dust particles started the process of aggregation and accretion around the bigger particles which became the embryos of the future planets. With the passage of time these embryos captured more and more matter and thus grew in size to become asteroids.

These asteroids further grew in size due to continuous accretion near by matter around them and thus they became planets.

(1) The gravitational force of the primitive sun was incapable of capturing dark matter scattered in the universe.

(2) According to some astrophysicists 'meteorites and asteroids were formed as a result of the disintegration of some planets and not the planets were formed out of meteorites and asteroids.

CRITICISM

(3) Till now no trace of remnants of dark matter could be discovered either in the archaeological drilling on the earth's surface or on any planet.